

# **Program Planning & Summary**

**Michael Witherell  
Visiting Committee  
March 15, 2003**

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# The Fermilab Program

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## Area of Particle Physics

- Theoretical Physics, Phenomenology & Data Analysis
- Electroweak Physics
- Lepton Flavor Physics
- Quark Flavor Physics
- Unification Scale Physics
- Cosmology & Particle Physics
- Particle-Astrophysics

## Fermilab program

Particle and Astro Theory  
Lattice QCD

Tevatron\*, LHC\*\*, LC

NuMI\*, MiniBooNE

BTeV, CKM

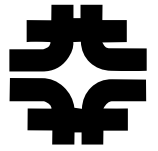
SloanDSS, CDMS\*

Auger\*

\*ongoing construction projects

The breadth of the Fermilab program reflects the US HEP program.

No experiments started since NuMI baselined in 1999.



# Planning the Future

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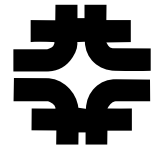
- Planning the future program of Fermilab is inextricably tied to planning the future of HEP.
- Most major programs using accelerators for particle physics require the expertise and facilities of Fermilab.
- We organize our planning in the context of the planning process for US HEP.
  - HEPAP subpanel
  - Facilities plan
  - P5
  - Neutrino task force...

## HEP Facilities Summary Table

	Project	Type	Physics	Cost	Scientific Potential	Proposed Facility	State of Readiness	Possible Time Scale
*	Linear Collider	High Energy Physics	Electroweak, QCD, Higgs, Dark Matter, Neutrinos	10-100 Bn USD	High	Fermilab, SLAC, DESY, KEK, ILC, CLIC, FCC, CEPC, SuperKEKB	Conceptual/Design	2030-2050
*	LHC Luminosity Upgrade							
X	LHC Energy Upgrade							
X	SNAP							
*	BTEV							
*	CKM							
	Super-B Factory							
	Double-Beta Decay							
*	Off-Axis Neutrino Detector							
*	Neutrino Super Beam							
X	Underground Detector							
*	Neutrino Factory							

# The Physics Advisory Committee

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- The Fermilab PAC does the most thorough review of experimental proposals of any review or advisory committee in US HEP.
  - review by a technical committee
  - presentations and questions through several PAC meetings leading up to a presentation meeting in April followed by a weeklong retreat at Aspen
  - carefully written reports produced at the end of each meeting meeting
  - extraordinary dedication of an excellent committee
- I urge you to read the PAC reports.

# The Physics Advisory Committee

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James Alexander, Cornell

James Brau, Oregon

Robert Cousins, UCLA  
(Chairman)

Takahiko Kondo, KEK

Andrew Lankford, Irvine

Joseph Lykken, Fermilab

Hitoshi Murayama, Berkeley

Michael Peskin, SLAC

Ronald Poling, Minnesota

Natalie Roe, LBNL

Heidi Schellman, Northwestern

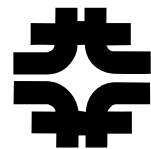
Paul Tipton, Rochester

Tejinder Virdee, CERN

[http://www.fnal.gov/directorate/program\\_planning/phys\\_adv\\_com/PACdates.html](http://www.fnal.gov/directorate/program_planning/phys_adv_com/PACdates.html)

# Example PAC Report: June, 2002

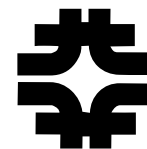
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- Short-term program
- Long-term program
- Run II
  - Physics
  - Luminosity
  - Off-line computing
  - Long, detailed appendix with recommendations to upgrade projects on preparations for baseline
- Future neutrino program
- Linear collider topics

# The Accelerator Advisory Committee

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V. Balakin, BINP

J.P. Delahaye, CERN

N. Holtkamp, ORNL

J.P. Koutchouk, CERN

T. Roser, BNL

L. Rossi, CERN

R. Ruth, SLAC

J. Rogers, Cornell

T. Shintake, KEK

F. Willeke, DESY (Chair)

J. Wurtele, UC Berkeley

- Last meeting 2/4-6/2003
- Reports in notebook, presentations at <http://www-bd.fnal.gov/aac/>



# Fermilab Long-range Planning Committee

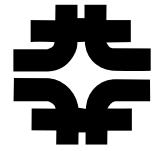
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- I am convening a long-range planning committee.
- I would like the Long-range Planning Committee to develop in detail a few realistically achievable options for the Fermilab program in the period 2011-2015 under each possible outcome for the linear collider.
- The goal in developing each option should be to optimize the opportunities available at Fermilab in this period for high energy physicists to answer the most important questions in our field.
- The options should be guided by the priorities for the field as laid out in the HEPAP subpanel and in the HEPAP response to the Office of Science on the facilities plan.

# Scientific Advisory Group

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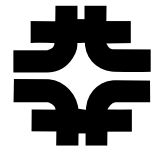


## Internal Advisory Group of Fermilab physicists

- M. Witherell
- K. Stanfield
- S. Holmes
- H. Montgomery
- J. Cooper
- V. White
- R. Kephart
- R. Dixon
- J. Butler
- M. Church
- K. Ellis
- D. Finley
- B. Foster
- D. Green
- R. Kolb
- A. Kronfeld
- P. Limon
- J. Lykken
- C. Newman Holmes
- C. Quigg
- J. Marriner
- P. McBride
- J. Strait
- R. Tschirhart
- J. Womersley
- A. Yagil

# Oversight of Project Management

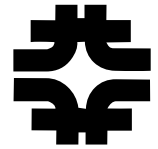
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- New DOE regime for oversight of projects came out in 2001.
  - DOE Order 413.3 increased the formality of project oversight.
  - The consequences of budget or schedule problems are more severe.
  - Even a mixed baseline review causes serious problems
- We have improved the way we oversee projects, including the establishment in 2001 of a new Office in the Directorate, led by Ed Temple, that
  - gives boot camp training for managers at the start of a project;
  - collects an excellent set of consultants, both internal and external, and conducts a cost, schedule, and management review before the DOE baselining review and subsequent Lehman reviews.

# Example: Run IIb Detector Upgrades

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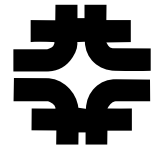


- Physics Advisory Committee
  - 6/2000
  - 6/2001
  - 6/2002 Recommendation of Stage I Approval
- Technical Review Committee 12/2001
- Director's Review of Cost, Schedule, and Management 4/2002
- Combined Technical and C,S,&M Review 8/2002

Lothar Bauerdick FNAL	Francesco Forti INFN/Pisa
Daniel Marlow Princeton	Jim Pilcher (Chair) Chicago
Hartmut Sadrozinski Santa Cruz	Mats Selen Univ. of Illinois/Urbana
Hiro Tajima SLAC	Giorgio Apollinari FNAL
Joel Butler FNAL	Tony Chargin ORNL/SNS
Dean Hoffer FNAL	Mark Reichanadter FNAL
Hiro Tajima SLAC	Ed Temple FNAL
- We held successful Lehman baseline reviews in September.
  - No action items, recommended reduced contingency, which we accepted

# Directorate at management meetings and major reviews

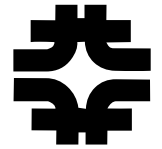
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- Weekly
  - All Experimenters      Scheduling
- Biweekly
  - Division Heads      Scientific Advisory
- PMGs (mostly monthly)
  - NuMI      CDF upgrade      D0 upgrade
  - Accelerator      US-CMS      US-LHC
- Other monthly
  - Run II Strategy      Lab Administrative
- 2-3 per year
  - PAC      AAC      DOE Accelerator
  - Board of Overseers
- 1 per year
  - URA Visiting      Ann. Program      Institutional onsite

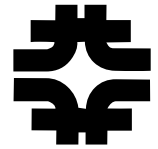
# First: The FY 2003 Budget

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- The budget presented for FY2003 at our Annual Program Review in March was \$298.3 M.
- So far this year, we have been working with a budget guidance of \$286.4 M, requiring \$11.9 M in cuts.
  - This led to the set of measures discussed at the 11/02 HEPAP meeting.
- The actual FY03 budget is **\$284.9 M**, an additional \$1.5 M lower.
  - This is a \$1.4 M decrease in base budget from FY2002.
  - The employment inflation increase of 4% is about \$13 M, so this represents a reduction in effort of about **\$15 M**.
  - **We are working on a two-year FY2003-4 problem.**

# FY04 budget request is bad for HEP, worse for Fermilab.

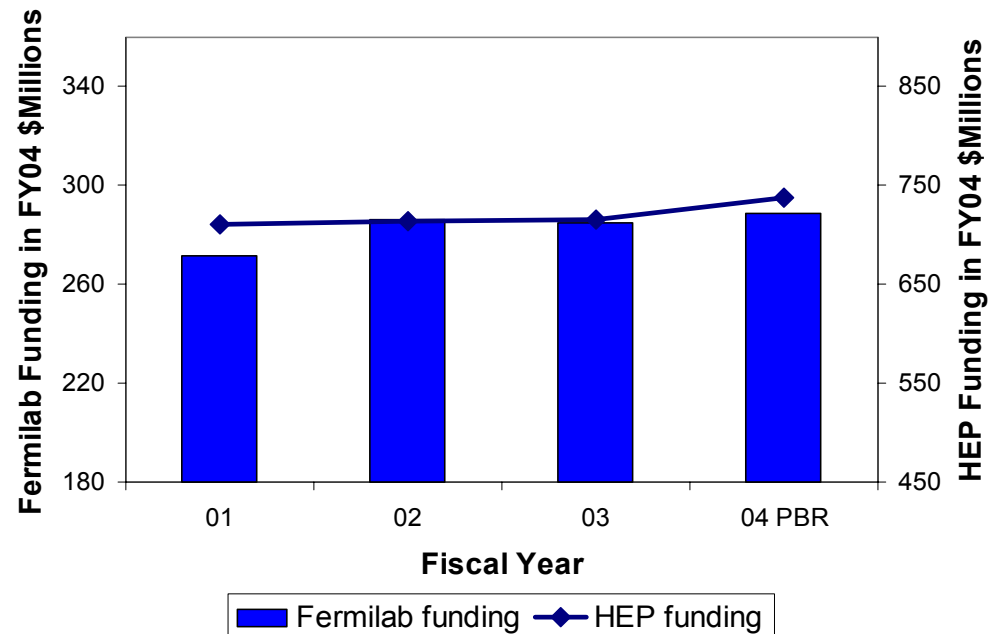


FY	02	03	04	02-04
HEP	713.2	715.7	738.0	3.5%
Fermilab base	286.2	284.8	288.5	0.8%
Fermilab total	310.6	311.6	303.3	-2.4%

Fermilab budget is \$288.5M.

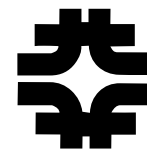
This is down 7% relative to inflation since FY2002.

- These are the critical years for collider upgrade.
- General reduction will take it down further.
- The proposal for ambitious upgrading of the Tevatron has not yet been funded.



# What we need in FY 2004 compared to FY 2003 actual

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• NuMI/MINOS	- 9 M
• Accelerator 14 M + inflation	+16 M
• CDF/D0	+ 4 M
• Accelerator R&D + other experiments	+ 3 M
• Inflation on SWF not included in above	+ 3 M
• Infrastructure	+ 3 M
• Power	<u>+ 1 M</u>
Total corresponds to \$306 M base	21 M

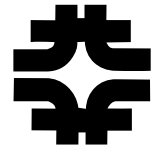
Increase in FY 2004 budget request  
compared to actual FY 2003  
Shortfall

+ 3.7 M  
~17 M



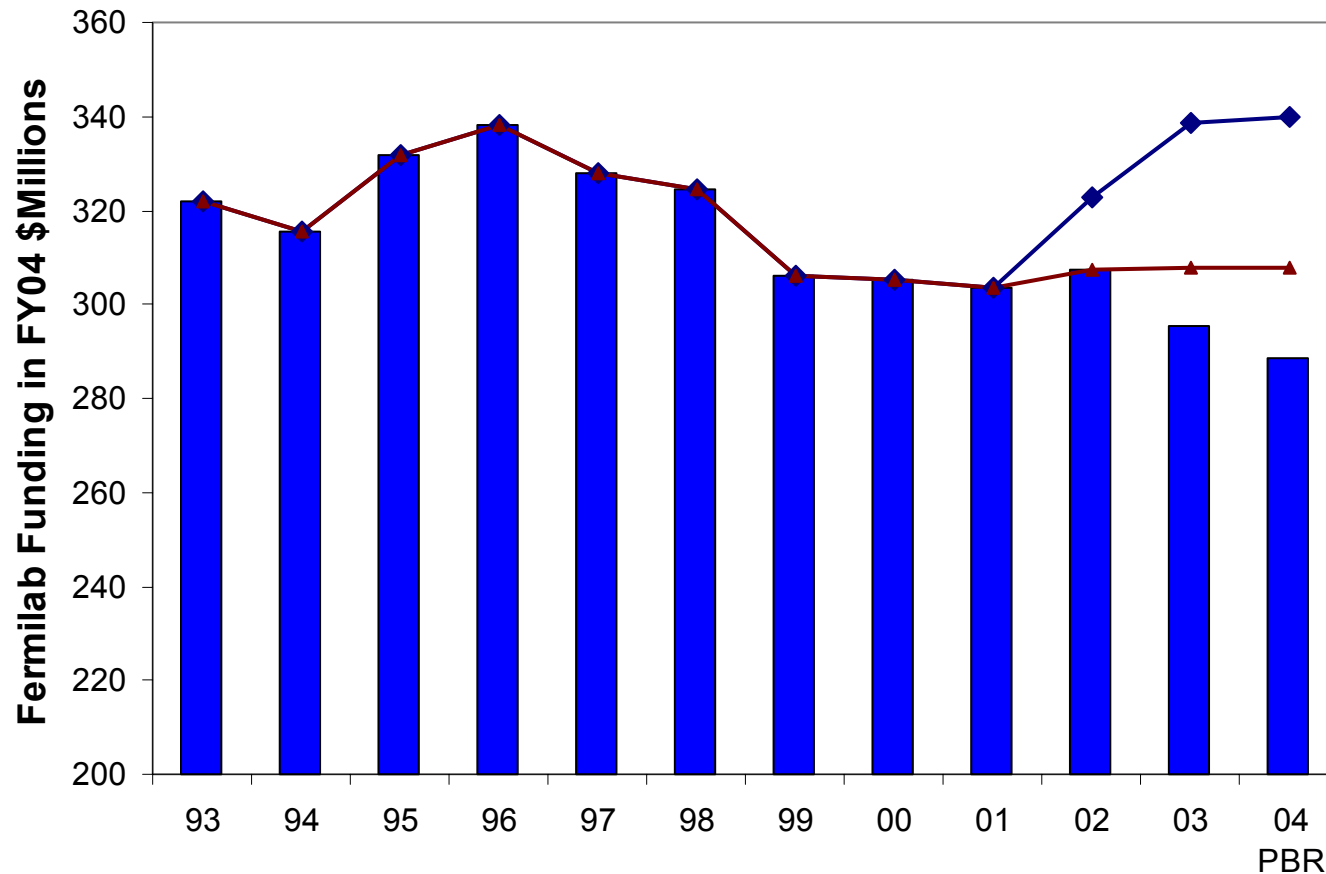
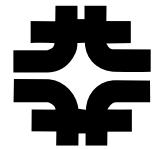
# Reducing the budget, starting from \$306 M

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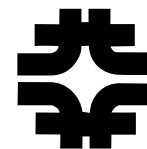
Step taken	reduction from \$306 M budget
• Reduce staff by ~30	\$1.5 M
• Reduce acc R&D & other expts again	4.5 M
• Keep infrastructure spending too low	3 M
• Reduce accelerator increase from planned \$16 M to \$10 M	6 M
• Other reductions, as yet not found	<u>2-3 M</u>
	17 M

# Fermilab Funding

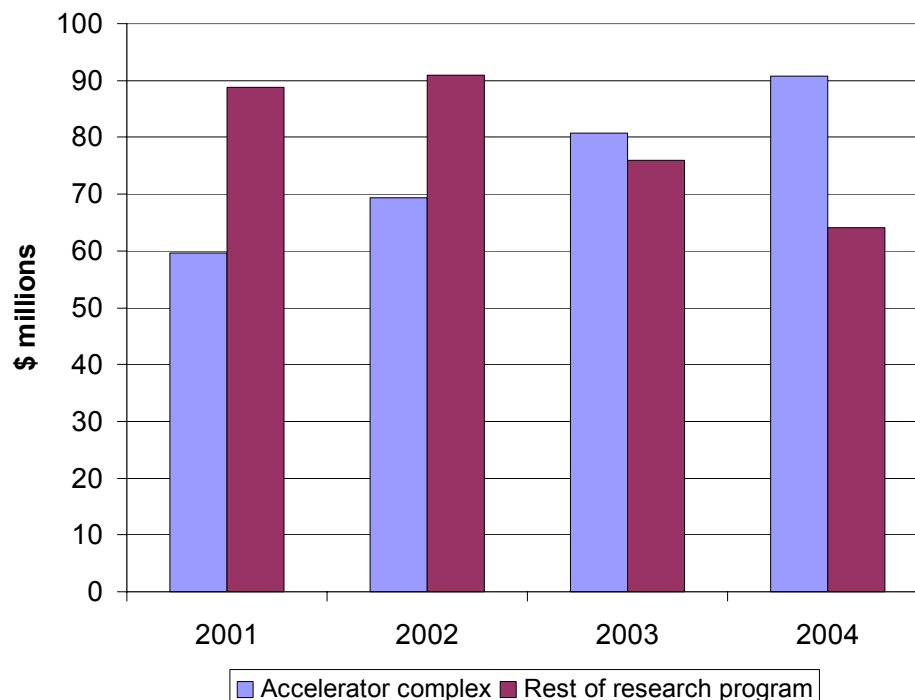


■ Fermilab funding, ECI corrected ◆ 3/01 Program Review ▲ 3/02 Program Review

# Accelerator effort grows within a flat Fermilab budget for 3<sup>rd</sup> year.



- Fermilab total loses ~6% to inflation.
- Accelerator effort +40% in constant dollars
- Rest of research program -40% in constant dollars
  - neutrino and other experiments
  - accelerator R&D
  - experimental astro
  - theory



	2001	2002	2003	2004	01-04
<b>Accelerator complex</b>	<b>59.6</b>	<b>69.4</b>	<b>80.8</b>	<b>90.8</b>	<b>52%</b>
<b>CDF+D0</b>	<b>39.3</b>	<b>39.5</b>	<b>41.8</b>	<b>45.8</b>	<b>17%</b>
<b>Support</b>	<b>86.2</b>	<b>86.3</b>	<b>86.4</b>	<b>87.8</b>	<b>2%</b>
<b>Rest of research program</b>	<b>88.8</b>	<b>91.0</b>	<b>75.9</b>	<b>64.1</b>	<b>-28%</b>
<b>Fermilab total</b>	<b>273.9</b>	<b>286.2</b>	<b>284.9</b>	<b>288.5</b>	<b>5%</b>



# The Distribution of Effort

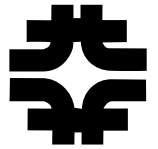
- The rough fraction of the laboratory research budget that supports the various programs:

Program	FY04 Funds (\$M)	% of total research
<b>Tevatron Collider</b>	<b>136</b>	<b>70</b>
Neutrino Program	22	11
LHC*	2+9	1+5
Accelerator R&D	9	5
Exp. Astrophysics*	3.5+1	2+1
BTeV	2	1
CKM	2	1
Fixed Target	3	1.5
Theory	4.5	2.5

**\*First number is Fermilab base funding, second is from LHC project or outside sources.**

# Summary

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- Run II physics is here.
  - The integrated luminosity is near the plan, but we need to realize increased luminosity and regain the stability obtained before the shutdown.
  - Miniboone is running well.
- Big projects, NuMI, US-LHC, US-CMS are making good progress.
- Budgets have hit future experiments and R&D hard. They threaten the Run II upgrade in FY04.
- Planning the future program of Fermilab is inextricably tied to planning the future of HEP.